NVM Express Technical Errata

Errata ID	**004**
Affected Spec Ver.	**NVM Express 1.0**
Corrected Spec Ver.	

Submission info

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This erratum addresses several items.

The Dataset Management command is modified to allow for up a physical discontinuity in the data buffer, enabling two PRP entries to be used. This is consistent with other similar commands in the specification (e.g., Identify or Set Features).

In the Compare and Write fused operation, an invalid status code is referred to that has been updated.

For the Abort command, it incorrectly refers to aborting only I/O commands when an I/O or Admin command may be aborted. This has been made generic.

The heading for the PCI Express Link Status includes an incorrect offset; it should be PXCAP + 12h instead of PXCAP + 13h.

For end-to-end data protection, it is clarified whether the CRC in protection information covers the additional metadata or not. Additionally, the disabling of checking based on the Application Tag and Reference Tag was not consistent with SBC-3 and has been corrected.

An I/O Command Set Specific range has been added to the Log Identifiers from 80h – BFh, consistent with other opcode, status code, and feature range allocations.

Description of the specification technical flaw

Modify section 6.6 as shown below:

6.6 Dataset Management command

The Dataset Management command is used by the host to indicate attributes for ranges of logical blocks. This includes attributes like frequency that data is read or written, access size, and other information that may be used to optimize performance and reliability.

The fields used are PRP Entry 1, PRP Entry 2, Command Dword 10, and Command Dword 11 fields. All other command specific fields are reserved.

Figure 109: Dataset Management – PRP Entry 1

Bit	Description
63:00	**PRP Entry 1 (PRP1):** Indicates a data ~~physically contiguous~~ buffer that contains the LBA range information. The buffer shall not have more than one physical discontinuity ~~This buffer shall be memory page aligned (based on the value in CC.MPS)~~ and shall be 4KB minimum in size.

Figure 110: Dataset Management – PRP Entry 2

Bit	Description
63:00	**PRP Entry 2 (PRP2):** This field contains the second PRP entry that specifies the location where data should be transferred from (if there is a physical discontinuity). This field shall not be a pointer to a PRP List.

Modify section 6.2.1 as shown below:

6.2.1 Compare and Write

The Compare and Write fused operation compares the contents of the LBA(s) indicated in the Compare command to the data stored at the indicated LBA range. If the compare is successful, then the LBA range is updated with the data provided in the Write command. If the Compare operation is not successful, then the Write operation is aborted with a status of ~~Fused Operation First Command Failed~~ Command Aborted due to Failed Fused Command and the LBA range is not modified. If the Write operation is not successful, the Compare operation completion status is unaffected.

Modify the first paragraph of section 5.1 as shown below:

5.1 Abort command

The Abort command is used to cancel/abort a specific ~~I/O~~ command previously issued to the Admin or an I/O Submission Queue. Host software may have multiple Abort commands outstanding, subject to the constraints of the Abort Command Limit indicated in the Identify Controller data structure. An abort is a best effort command; the command to abort may have already completed, currently be in execution, or may be deeply queued. It is implementation specific if/when a controller chooses to complete the command with an error (i.e., Requested Command to Abort Not Found) when the command to abort is not found.

Modify the heading of section 2.5.8 as shown below:

2.5.8 Offset PXCAP + 12h ~~13h~~: PXLS – PCI Express Link Status

Modify the first paragraph of section 8.3 as shown below:

To provide robust data protection from the application to the NVM media and back to the application itself, end-to-end data protection may be used. When this optional mechanism is enabled, additional protection information (e.g. CRC) is added to the LBA that may be evaluated by the controller and/or host software to determine the integrity of the LBA. This additional protection information, if present, is either the first eight bytes of metadata or the last eight bytes of metadata, based on the format of the namespace. For metadata formats with more than eight bytes, if the protection information is contained within the first eight bytes of metadata, then the CRC does not cover any metadata bytes. For metadata formats with more than eight bytes, if the protection information is contained within the last eight bytes of metadata, then the CRC covers all metadata bytes up to but excluding these last eight bytes. As described in section 8.2, metadata and hence this protection information may be configured to be contiguous with the LBA data or stored in a separate buffer.

Modify the second to last paragraph of section 8.3 as shown below:

Protection checking may be disabled as a side effect of the value of the protection information Application Tag and Reference Tag fields regardless of the state of the PRCHK field in the command. When the namespace is formatted for Type 1 or Type 2 protection, all protection information checks are disabled regardless of the state of the PRCHK field when the protection information Application Tag has a value of FFFFh. When the namespace is formatted for Type ~~2~~ 3 protection, all protection information checks are disabled regardless of the state of the PRCHK field when the protection information Application Tag has a value of FFFFh and the protection information Reference Tag has a value of FFFF_FFFFh.

Modify Figure 57 as shown below:

Figure 57: Get Log Page – Log Identifiers

Log Identifier	O/M	Description
00h		Reserved
01h	M	Error Information
02h	M	SMART / Health Information
03h	M	Firmware Slot Information
04h – 7Fh		Reserved
80h – BFh		I/O Command Set Specific
~~80h~~ C0h – FFh		Vendor specific

O/M: O = Optional, M = Mandatory

Disposition log

3/9/2011	Erratum captured.
4/26/2011	Erratum ratified.